

Technical Publication
PI-1005R3

Pre-Installation

HF Series Generators

REVISION HISTORY

REVISION	DATE	REASON FOR CHANGE
0	JUL 15, 2002	First edition
1	SEP 20, 2003	kW corrections for SHF-5xx model
2	FEB 17, 2004	New equipments
3	SEP 15, 2005	Revision of environmental and electrical requirements

This Document is the English original version, edited and supplied by the manufacturer.

The Revision state of this Document is indicated in the code number shown at the bottom of this page.

ADVISORY SYMBOLS

The following advisory symbols will be used throughout this manual. Their application and meaning are described below.



DANGERS ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED OR AVOIDED WILL CAUSE SERIOUS PERSONAL INJURY OR DEATH.



ADVISE OF CONDITIONS OR SITUATIONS THAT IF NOT HEHEDED OR AVOIDED COULD CAUSE SERIOUS PERSONAL INJURY, OR CATASTROPHIC DAMAGE OF EQUIPMENT OR DATA.



Advise of conditions or situations that if not heeded or avoided could cause personal injury or damage to equipment or data.

Note

Alert readers to pertinent facts and conditions. Notes represent information that is important to know but which do not necessarily relate to possible injury or damage to equipment.

TABLE OF CONTENTS

Section	Page
1 INTRODUCTION	1
1.1 Responsibility of Purchaser	1
2 PRE-INSTALLATION DATA	3
3 ROOM REQUIREMENTS	11
3.1 Environmental Requirements	11
3.2 Electrical Requirements	11
3.3 Line Powered Generators – Power Line Requirements	12
3.4 Line Powered Generators – Recommended Wire Size	15
3.5 Capacitor Assisted Generators – Power Line Requirements	17
3.6 Capacitor Assisted Generators – Recommended Wire Size	17
3.7 Battery Powered generators – Power Line Requirements	18
3.8 Battery Powered Ggenerators – Recommended Wire Size	18
3.9 Interconnection and Grounding Requirements	19
3.10 Safety Devices	22

SECTION 1 INTRODUCTION

This Pre-Installation document provides the information and data needed to plan and qualify the customer site prior to equipment delivery and installation.

This document considers only the Generator and its associated components. Product information, environmental and electrical requirements are specified.

For system-related requirements, such as room layout, and system interconnections, refer to documentation provided with other subsystems.

1.1 RESPONSIBILITY OF PURCHASER

Site planning and preparation are the responsibilities of the purchaser. The following points should be considered fundamental to the customers Pre-Installation activities; addition work may be needed depending on specific site circumstances:

- Install required material prior the delivery of the system components.
- Complete room floor, ceiling and wall finish.
- Install conduit, duct, and raceway.
- Install proper size junction boxes with covers at locations specified in the installation plan.
- Install mains power of proper voltage output and adequate kVA rating.
- Install all safety devices according to this document and Local Codes.
- Provide current room dimensions, including hall way and entry door sizes.

Note 

Complete and proper Pre-Installation will avoid delays and confusion.

This page intentionally left blank.

SECTION 2 PRE-INSTALLATION DATA

This section provides product information and illustrations showing physical dimensions, weight, mounting holes and normal access areas for cabling and service. (Refer to Illustration 2-1.)

PHYSICAL CHARACTERISTICS

COMPONENT	DIMENSIONS			WEIGHT
	Length	Width	Height	

LINE POWERED GENERATORS

Vertical Generator Cabinet with LF-RAC (LSS) or DRAC (HSS)	506 mm	468 mm	1101 mm	148 kg
Compact Generator Cabinet (for only 1 Tube (LSS))	445 mm	360 mm	568 mm	72 kg
Compact Generator Cabinet (for 1 or 2 Tubes (LSS or HSS))	592 mm	360 mm	690 mm	95 kg

CAPACITOR ASSISTED GENERATORS

Compact Generator Cabinet with Capacitors Module	500 mm	360 mm	790 mm	108 kg
---	--------	--------	--------	--------

BATTERY POWERED GENERATORS

Compact-ESM Generator Cabinet with Batteries Module	813 mm	436 mm	948 mm	235 kg
Compact-ESM Generator Cabinet with Batteries Module (17 A/h batteries)	813 mm	436 mm	1223 mm	372 kg

PHYSICAL CHARACTERISTICS

COMPONENT	DIMENSIONS			WEIGHT
	Length	Width	Height	

STANDARD CONTROL CONSOLES

RAD Control Consoles	w/o Pedestal	433 mm	298 mm	123 mm	8 kg
	with Pedestal	433 mm	298 mm	1023 mm	22 kg
R&F Control Consoles	w/o Pedestal	554 mm	360 mm	124 mm	12 kg
	with Pedestal	554 mm	360 mm	1010 mm	35 kg
RAD Console Graphic Display	with Handswitch support	545 mm	290 mm	50 mm	6 kg
	w/o Handswitch support	430 mm	290 mm	50 mm	6 kg
Touch Screen Console (TPC 10" or 12")	with Handswitch support	468 mm	290 mm	114 mm	8 kg
	w/o Handswitch support	360 mm	290 mm	114 mm	8 kg
Optional Pedestal for RAD Console Graphic Display or Touch Screen Console		298 mm	236 mm	930 mm	10 kg
<i>Note. - Dimensions for no-standard Consoles are not indicated in this document.</i>					

TOUCH SCREEN CONSOLE AND PC UNIT

Touch Screen Console	400 mm	200 mm	400 mm	5 kg
PC Unit	480 mm	200 mm	400 mm	15 kg
PC Interface Box	130 mm	140 mm	46 mm	0.6 kg
<i>Note. - Specifications of Touch Screen Consoles and PC Units subject to change without notice.</i>				

METHOD OF MOUNTING

COMPONENT	NORMAL METHOD OF MOUNTING
Generator Cabinet	Floor freestanding, wall mounted or anchor to floor with four M10 (3/8") bolts.
Control Consoles	Desk freestanding, wall mounted or anchor to an optional pedestal.
<i>Note: Anchoring hardware should be field supplied. For seismic areas all components must be anchored, Local Standards should be applied.</i>	

MINIMUM RECOMMENDED FREE AREA FOR SERVICE ACCESS

COMPONENT	SURFACE					
	Left Side	Right Side	Front	Rear	Top	Bottom
Generator Cabinet	50 cm (20")	50 cm (20")	100 cm (40")	- (see note)	Completely free	-
Control Consoles	10 cm (4")	10 cm (4")	Completely free	10 cm (4")	Completely free	-
<i>Note: Ventilation conditions requires to keep a minimum free distance of 15 cm (6") from both lateral sides of the Generator Cabinet and also the same distance from the rear side when the Generator is provided with High Speed Starter (fans for the starter module).</i>						

Illustration 2-1
Generators

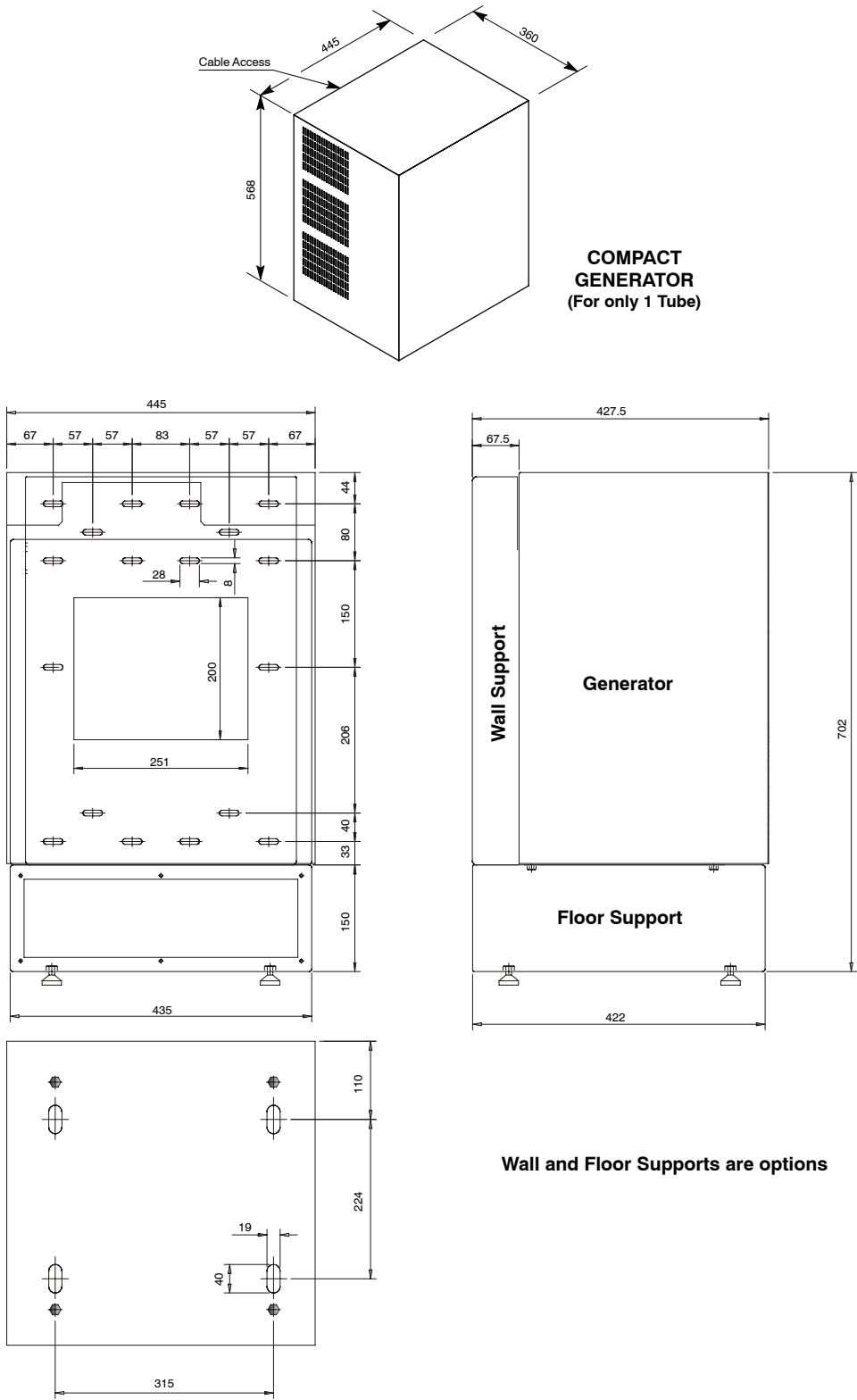


Illustration 2-1 (cont.)
Generators

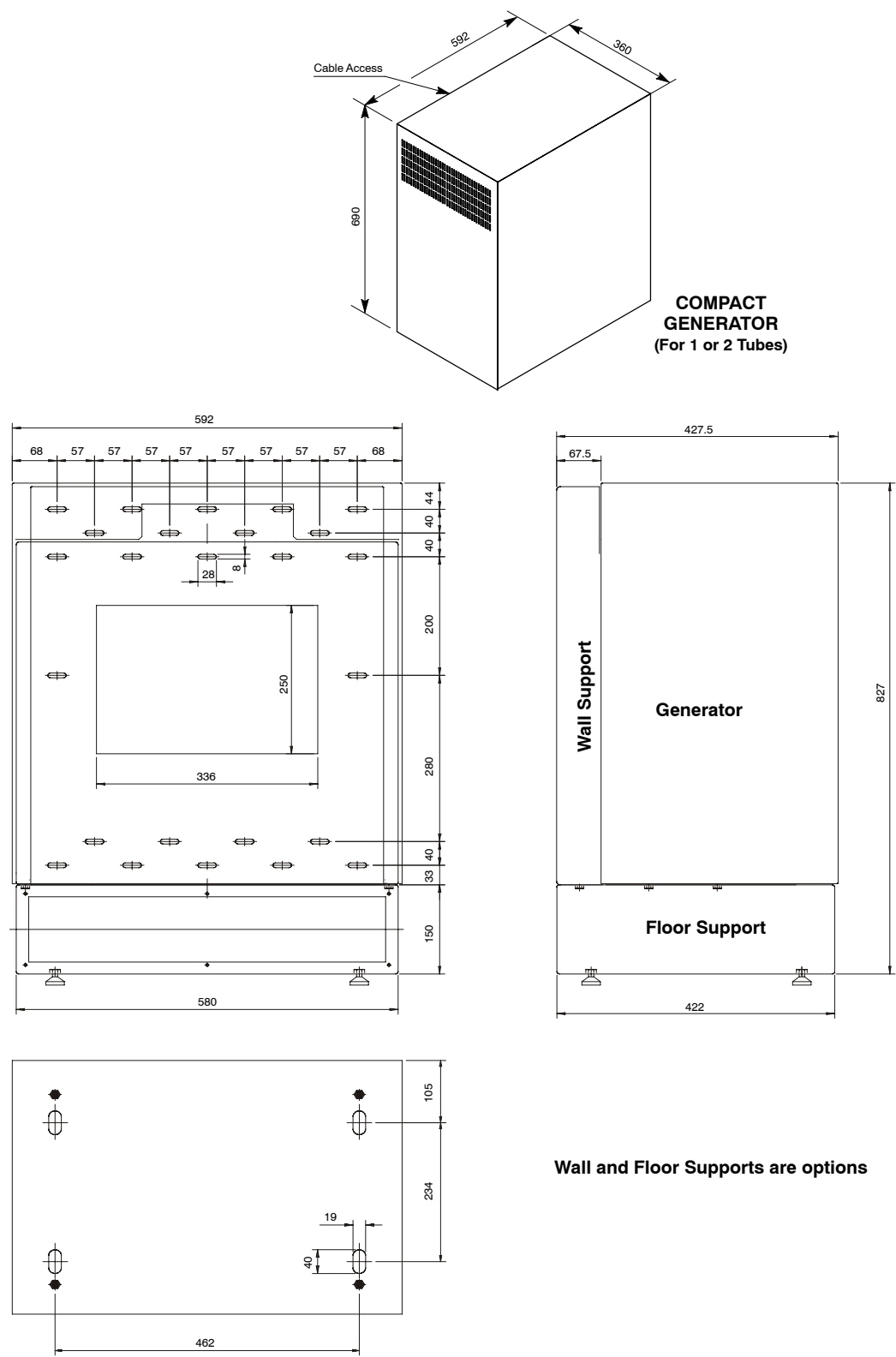


Illustration 2-1 (cont.)
Generators

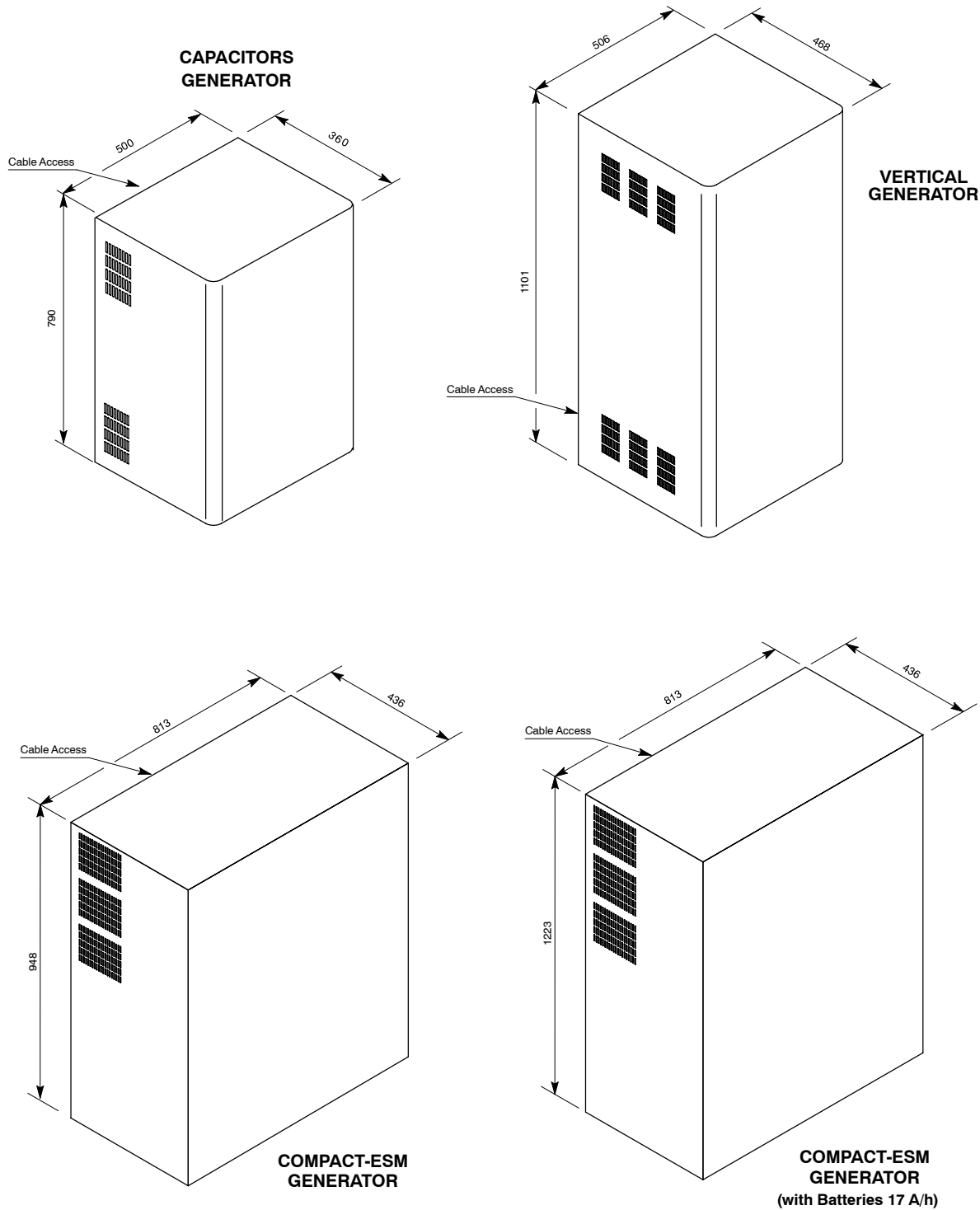


Illustration 2-1 (cont.)
Consoles

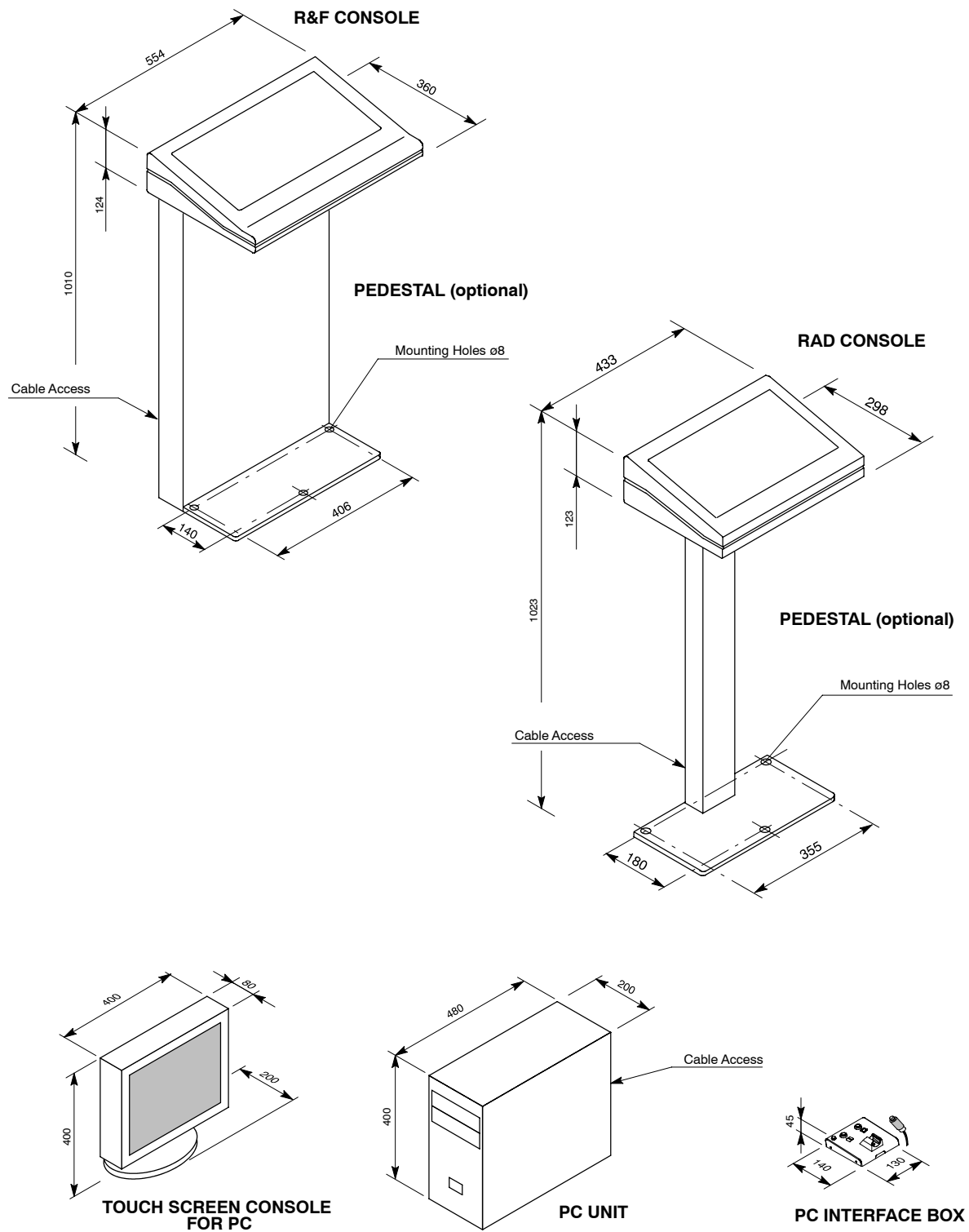


Illustration 2-1 (cont.) Consoles

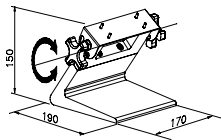
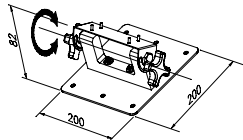
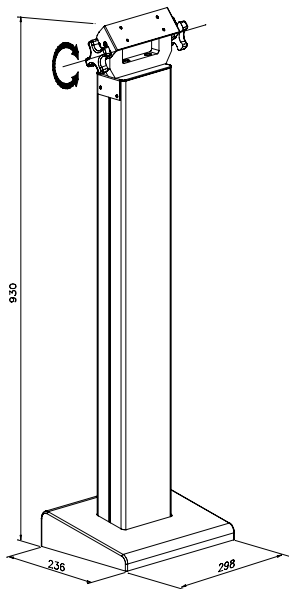


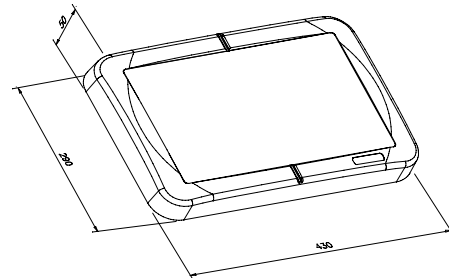
TABLE SUPPORT



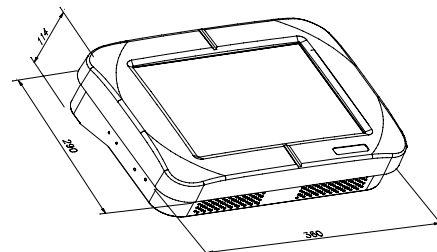
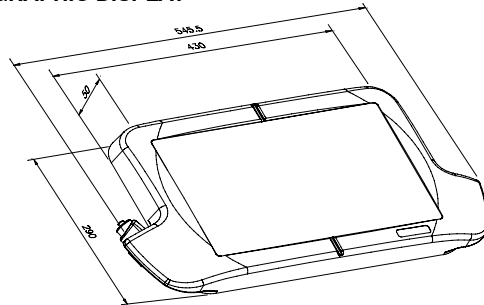
WALL SUPPORT



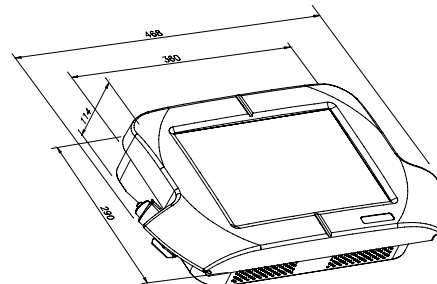
PEDESTAL



RAD CONSOLES - GRAPHIC DISPLAY



TOUCH SCREEN CONSOLES (TPC)



THESE CONSOLES CAN BE MOUNTED ON A TABLE SUPPORT, WALL SUPPORT OR PEDESTAL

SECTION 3 ROOM REQUIREMENTS

3.1 ENVIRONMENTAL REQUIREMENTS

	LINE POWERED GENERATORS / CAPACITOR ASSISTED GENERATORS	BATTERY POWERED GENERATORS
Storage / Transport Environmental Conditions	Temperature range of -40°C to 70°C Relative Humidity range of 10% to 100% Atmospheric Pressure range of 500 hPa to 1060 hPa	Temperature range of -20°C to 40°C Relative Humidity range of 10% to 100% Atmospheric Pressure range of 500 hPa to 1060 hPa
Operating Environmental Conditions	Temperature range of 10°C to 40°C (Battery Powered Generators: for a longer life cycle of batteries it is recommended a temperature around 22°C) Relative Humidity (no condensing) range of 30% to 75% Atmospheric Pressure range of 700 hPa to 1060 hPa	
Heat Output	In normal environmental circumstances the maximum heat output of the equipment can reach: <ul style="list-style-type: none"> - for Line Powered Generators 0.16 kW (544 btu/hr) - for Capacitor Assisted Generators 0.20 kW (682 btu/hr) - for Battery Powered Generators 0.26 kW (890 btu/hr). Components must not be allowed to overheat. Overheating of components can cause system malfunction.	

3.2 ELECTRICAL REQUIREMENTS

This Generator contains advanced circuitry which will maintain the selected X-ray techniques during adverse line conditions. However, there is a limit to the Generators ability to correct for inadequate line power.

To ensure proper operation:

- Do not under size the Distribution Transformer (*Line Powered Generators*). It is recommended that the secondary of Distribution Transformer has a “Star” configuration.
- Size feeder and ground wires per this document.
- Ensure and maintain input mains voltage to specification. **Ensure that the ground resistance is lower than 10 Ω .**

The power requirements given here (wire sizes, etc.) are the recommended specification. With the exception of high current carrying conductors and grounds, low voltage connections are made with preterminated wires.



The installation should comply with all the electrical requirements indicated in this document. These requirements should be upgraded if Local Standards were more stringent.

3.3 LINE POWERED GENERATORS - POWER LINE REQUIREMENTS

- Operation:

GENERATOR MODEL	SHF-310	SHF-315	SHF-320	SHF-325	SHF-330	SHF-335
Max. Power kW	32 kW					
Maximum mA	400 mA					
Maximum kVp	125 kVp	150 kVp	125 kVp	150 kVp	125 kVp	150 kVp
Power Line	A	A	B	B	C / D	C / D

GENERATOR MODEL	SHF-410	SHF-415	SHF-420	SHF-425	SHF-430	SHF-435
Max. Power kW	40 kW					
Maximum mA	500 mA					
Maximum kVp	125 kVp	150 kVp	125 kVp	150 kVp	125 kVp	150 kVp
Power Line	A	A	B	B	C / D	C / D

GENERATOR MODEL	SHF-510	SHF-515	SHF-520	SHF-525	SHF-530	SHF-535
Maximum Power kW	50 kW					
Maximum mA	640 mA (or 630 mA under special order)					
Maximum kVp	125 kVp	150 kVp	125 kVp	150 kVp	125 kVp	150 kVp
Power Line	A	A	B	B	C / D	C / D

GENERATOR MODEL	SHF-630	SHF-635	SHF-835
Maximum Power kW	64 kW (or 65 kW under special order)		80 kW
Maximum mA	640 mA (or 650 mA under special order)		800 mA (or 1000 mA under special order)
Maximum kVp	125 kVp	150 kVp	150 kVp
Power Line	C / D	C / D	D (or E for 1000 mA)

POWER LINE				
A	B	C	D	E
230 / 240 VAC, Single-Phase, 50 / 60 Hz	230 / 240 VAC, Three-Phase, 50 / 60 Hz	400 / 415 / 440 VAC, Three-Phase, 50 / 60 Hz	480 VAC, Three-Phase, 50 / 60 Hz	530 VAC, Three-Phase, 50 / 60 Hz
Line voltage automatic compensation: $\pm 10\%$.				
Maximum line regulation for maximum kVA demand: 5%.				
NOTES: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input. - For 80 kW Generators operating with lines at 400 / 415 / 440 VAC an auxiliary boost transformer is required to adequate the line voltage to 480 VAC (or 530 VAC).				

- RMS line current during a X-ray exposure, minimum line power required, Generator stand-by consumption (W), the differential sensitivity (mA) and the thermomagnetic breaker should be:

LINE VOLTAGE	SINGLE-PHASE GENERATORS		
	32 kW	40 kW	50 kW
208 VAC *	192 A	240 A	300 A
230 VAC	174 A	217 A	272 A
240 VAC	167 A	208 A	260 A
Minimum kVA required	Maximum kW x 1.25		
Stand-by Consumption	500 W		
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA		
Differential, Thermomagnetic (Fuses) and Contactor	50% of the RMS line current (RMS = momentary line current based on 100 ms X-ray exposures)		
NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input.			

LINE VOLTAGE	THREE-PHASE GENERATORS				
	32 kW	40 kW	50 kW	64 kW (or 65 kW)	80 kW *
208 VAC *	111 A	138 A	173 A	-	-
230 VAC	100 A	125 A	156 A		
240 VAC	96 A	120 A	150 A	-	-
400 VAC	58 A	72 A	90 A	115 A	144 A
415 VAC	55 A	69 A	87 A	111 A	139 A
440 VAC	52 A	65 A	82 A	105 A	135 A
480 VAC	48 A	60 A	75 A	96 A	120 A
Minimum kVA required	Maximum kW x 1.25				
Stand-by Consumption	500 W				
Differential Sensitivity (Earth Leakage / Ground Fault)	30 mA				
Differential, Thermomagnetic (Fuses) and Contactor	50% of the RMS line current (RMS = momentary line current based on 100 ms X-ray exposures)				
NOTES: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input. - For 80 kW Generators operating with lines at 400 / 415 / 440 VAC an auxiliary boost transformer is required to adequate the line voltage to 480 VAC (or 530 VAC).					

HF Series Generators

Pre-Installation

- Maximum Power Line Impedance. The Impedance of the Power Line in the installation must be lower than the maximum value indicated below:

LINE VOLTAGE	SINGLE-PHASE GENERATORS POWER		
	32 kW	40 kW	50 kW
208 VAC *	0.045 Ω	0.035 Ω	0.028 Ω
230 VAC	0.055 Ω	0.045 Ω	0.036 Ω
240 VAC	0.060 Ω	0.045 Ω	0.036 Ω
NOTES: - The above values comply with the Standard IEC-60601.2.7. - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input.			

LINE VOLTAGE	THREE-PHASE GENERATORS POWER				
	32 kW	40 kW	50 kW	64 kW (or 65 kW)	80 kW *
208 VAC *	0.070 Ω	0.055 Ω	0.044 Ω	N.A.	N.A.
230 VAC	0.087 Ω	0.070 Ω	0.056 Ω	N.A.	N.A.
240 VAC	0.094 Ω	0.075 Ω	0.060 Ω	N.A.	N.A.
400 VAC	0.270 Ω	0.220 Ω	0.170 Ω	0.135 Ω	0.110 Ω
415 VAC	0.300 Ω	0.240 Ω	0.180 Ω	0.150 Ω	0.120 Ω
440 VAC	0.340 Ω	0.270 Ω	0.200 Ω	0.170 Ω	0.135 Ω
480 VAC	0.400 Ω	0.320 Ω	0.240 Ω	0.200 Ω	0.160 Ω
NOTES: - The above values comply with the Standard IEC-60601.2.7. - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input. - For 80 kW Generators operating with lines at 400 / 415 / 440 VAC an auxiliary boost transformer is required to adequate the line voltage to 480 VAC (or 530 VAC).					

3.4 LINE POWERED GENERATORS - RECOMMENDED WIRE SIZE

Correct sizing of the feeder wires is critical to proper Generator operation. Wire size is dependent on the Generator power, the line voltage and the distance from the Distribution Transformer to the Generator Cabinet. The maximum voltage drop during an exposure must not exceed 5% of the nominal mains value.

It is recommended that the Distribution Transformer (Hospital) used as power source have at least a power of the 25% more than the maximum power of the X-ray Generator.

Recommended wire sizing is indicated in Table 3-1. These lengths are measured from the Distribution Transformer to the Room Electrical Cabinet (room disconnect). **From the Room Electrical Cabinet to the Generator Cabinet 16 mm² (AWG 6) may be used as long as that length does not exceed 6 m (20 ft). The maximum wire size that can be connected to the Generator Cabinet (Input Line Fuse Holder) is 35 mm² (AWG 2).**

Table 3-1
Minimum Wire Size from Distribution Transformer to Room Electrical Cabinet

GENERATOR	LINE VOLTAGE	WIRE SIZE AT:							
		15 m		30 m		45 m		60 m	
32 kW, 1 ϕ	208 VAC *	50 mm ²	AWG 1/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
	230 VAC	50 mm ²	AWG 1/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
	240 VAC	50 mm ²	AWG 1/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
32 kW, 3 ϕ	208 VAC *	35 mm ²	AWG 2	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0
	230 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0
	240 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	83 mm ²	AWG 3/0	105 mm ²	AWG 4/0
	400 VAC	16 mm ²	AWG 6	35 mm ²	AWG 2	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0
	415 VAC	16 mm ²	AWG 6	35 mm ²	AWG 2	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0
	440 VAC	16 mm ²	AWG 6	35 mm ²	AWG 2	50 mm ²	AWG 1/0	50 mm ²	AWG 1/0
	480 VAC	16 mm ²	AWG 6	25 mm ²	AWG 4	35 mm ²	AWG 2	50 mm ²	AWG 1/0
40 kW, 1 ϕ	208 VAC *	70 mm ²	AWG 2/0	120 mm ²	AWG 4/0	120 mm ²	AWG 4/0	-	-
	230 VAC	70 mm ²	AWG 2/0	120 mm ²	AWG 4/0	120 mm ²	AWG 4/0	-	-
	240 VAC	70 mm ²	AWG 2/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0	-	-
40 kW, 3 ϕ	208 VAC *	35 mm ²	AWG 2	70 mm ²	AWG 2/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0
	230 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0
	240 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0
	400 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0	83 mm ²	AWG 3/0
	415 VAC	25 mm ²	AWG 4	35 mm ²	AWG 2	70 mm ²	AWG 2/0	70 mm ²	AWG 2/0
	440 VAC	16 mm ²	AWG 6	35 mm ²	AWG 2	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0
	480 VAC	16 mm ²	AWG 6	35 mm ²	AWG 2	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0

NOTE: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input.

HF Series Generators

Pre-Installation

Table 3-1 (cont.)

Minimum Wire Size from Distribution Transformer to Room Electrical Cabinet

GENERATOR	LINE VOLTAGE	WIRE SECTION AT:							
		15 m		30 m		45 m		60 m	
50 kW, 1 ϕ	208 VAC *	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-	-	-
	230 VAC	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-	-	-
	240 VAC	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-	-	-
50 kW, 3 ϕ	208 VAC *	50 mm ²	AWG 1/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
	230 VAC	50 mm ²	AWG 1/0	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
	240 VAC	50 mm ²	AWG 1/0	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0	-	-
	400 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0
	415 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0
	440 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0	83 mm ²	AWG 3/0
	480 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	70 mm ²	AWG 2/0	83 mm ²	AWG 3/0
64 kW, 3 ϕ (or 65 kW, 3 ϕ)	400 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0
	415 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	83 mm ²	AWG 3/0	120 mm ²	AWG 4/0
	440 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	83 mm ²	AWG 3/0	105 mm ²	AWG 4/0
	480 VAC	25 mm ²	AWG 4	50 mm ²	AWG 1/0	83 mm ²	AWG 3/0	105 mm ²	AWG 4/0
* 80 kW, 3 ϕ	400 VAC	50 mm ²	AWG 1/0	83 mm ²	AWG 3/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0
	415 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0
	440 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	105 mm ²	AWG 4/0	120 mm ²	AWG 4/0
	480 VAC	35 mm ²	AWG 2	70 mm ²	AWG 2/0	95 mm ²	AWG 3/0	120 mm ²	AWG 4/0

NOTES: - For lines at 210 VAC or below an auxiliary boost transformer is required to adequate the line voltage to the Generator input.
- For 80 kW Generators operating with lines at 400 / 415 / 440 VAC an auxiliary boost transformer is required to adequate the line voltage to 480 VAC (or 530 VAC).

3.5 CAPACITOR ASSISTED GENERATORS - POWER LINE REQUIREMENTS

- Operation:
 - Single-Phase at 100 / 110 / 120 / 208 / 230 / 240 VAC.
 - Line voltage automatic compensation: $\pm 10\%$.
 - 50 Hz / 60 Hz.
- Thermomagnetic Interruptor / Circuit Breaker rating should be:
 - 8 / 10 / 12.5 / 16 / 20 A (1P+N).
- Differential Sensitivity: 30 mA
- Minimum kW required: 2.0 kW
- Line Impedance should comply with Standard IEC-60601.2.7.

3.6 CAPACITOR ASSISTED GENERATORS - RECOMMENDED WIRE SIZE

The minimum recommended wire size for the line voltage is:

LINE VOLTAGE	WIRE SIZE	
100 / 110 VAC	4 mm ²	AWG 12
208 / 230 / 240 VAC	2.5 mm ²	AWG 14

3.7 BATTERY POWERED GENERATORS - POWER LINE REQUIREMENTS

- Operation:
 - Single-Phase at 110 / 208 / 230 / 240 VAC.
 - Line voltage automatic compensation: $\pm 15\%$.
 - 50 Hz / 60 Hz.
- Thermomagnetic Interruptor / Circuit Breaker rating should be:
 - 10 A (1P+N curve type D).
- Differential Sensitivity: 30 mA
- Minimum kW required:
 - without Stand-Alone option: 2.2 kW
 - with Stand-Alone option: 0.5 kW
- Line Impedance should comply with Standard IEC-60601.2.7.

3.8 BATTERY POWERED GENERATORS - RECOMMENDED WIRE SIZE

The minimum recommended wire size for the line voltage is:

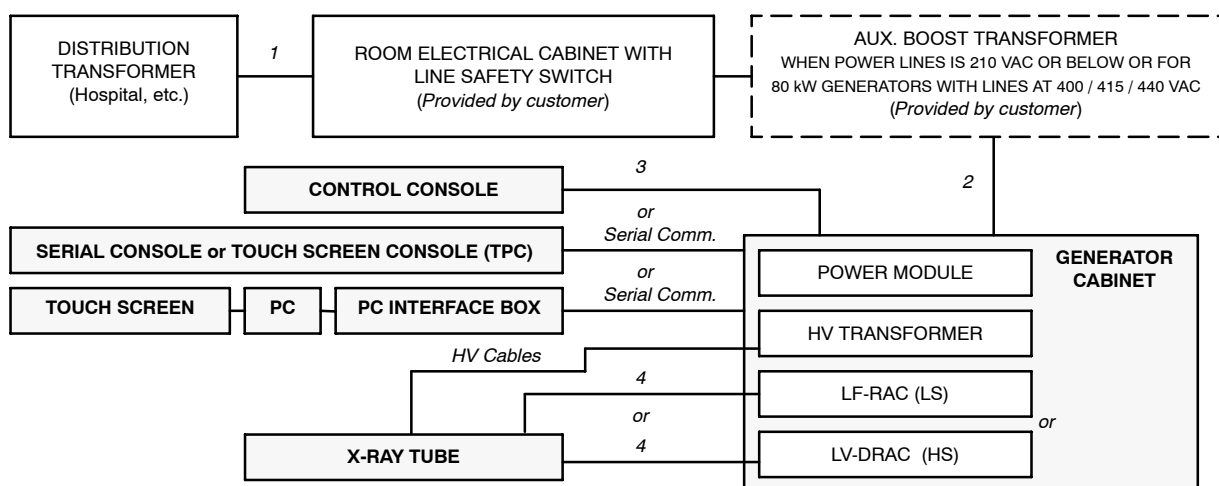
LINE VOLTAGE	WIRE SIZE	
110 VAC	4 mm ²	AWG 12
208 / 230 / 240 VAC	2.5 mm ²	AWG 14

3.9 INTERCONNECTION AND GROUNDING REQUIREMENTS

Every installation must be provided with a main line disconnect device (thermomagnetic breaker) and the remote disconnect devices required at all Consoles that are not located next to the line safety switch. *(For more information about interconnection and grounding refer to "Installation" document).*

Illustration 3-1

Interconnection Block Diagram for LINE POWERED GENERATORS



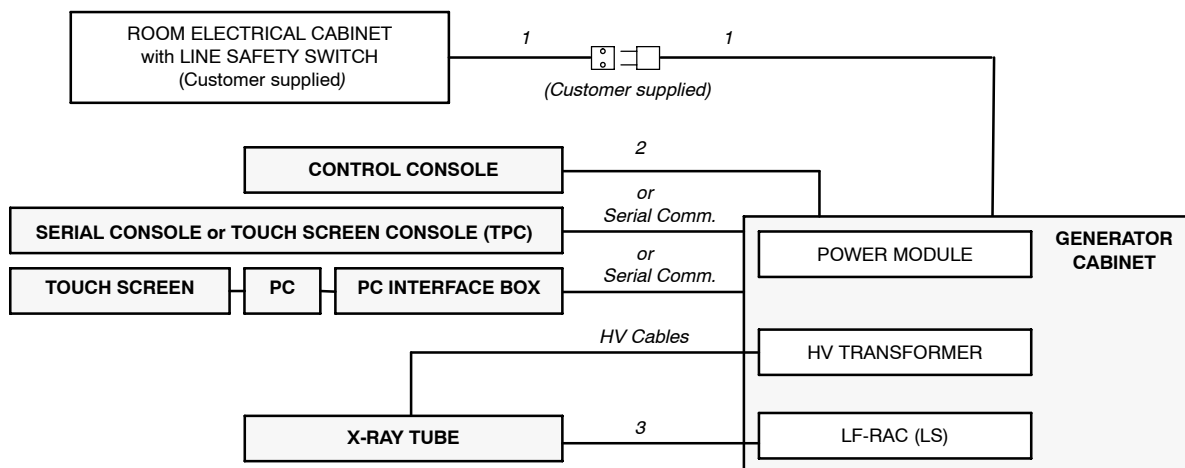
Note

For Serial Generators (RS232 / RS422): Console CPUs are located inside the Generator Cabinet and Interconnections are factory made. Only one cable (serial communication) from J5 of the Generator Cabinet should be connected to the Serial Console, Touch Screen Console or PC Interface Box.

CABLE RUN	FUNCTION	REMARKS
1	Single or Three Phase Power. (1 ϕ : 230 / 240 VAC) (3 ϕ : 230 / 240 VAC or 400 / 415 / 440 / 480 VAC)	Connect to Room Electrical Cabinet according to the indicated electrical requirements. <i>Customer supplied.</i>
	Ground.	
2	Single or Three Phase Power. (1 ϕ : 230 / 240 VAC) (3 ϕ : 230 / 240 VAC or 400 / 415 / 440 / 480 VAC)	Connect to Generator according to the indicated electrical requirements. Install an Auxiliar Boost Transformer when it is required. <i>Customer supplied.</i>
	Ground.	
3	Control Signals and Ground	Cable quantity depends on the options installed (AEC, etc.)
4	Stator Supply.	<i>Provided with X-ray Tube.</i>
	Ground.	
	Generator provided with LV-DRAC requires a shielded stator cable. (Refer to "Installation" document).	<i>Field supplied.</i>
NOTES: - For wire size refer to Section 3.4. Consult to Local Standards for feeder and ground wire size requirements. - The system power ground point is located in the Generator Cabinet.		

Illustration 3-2

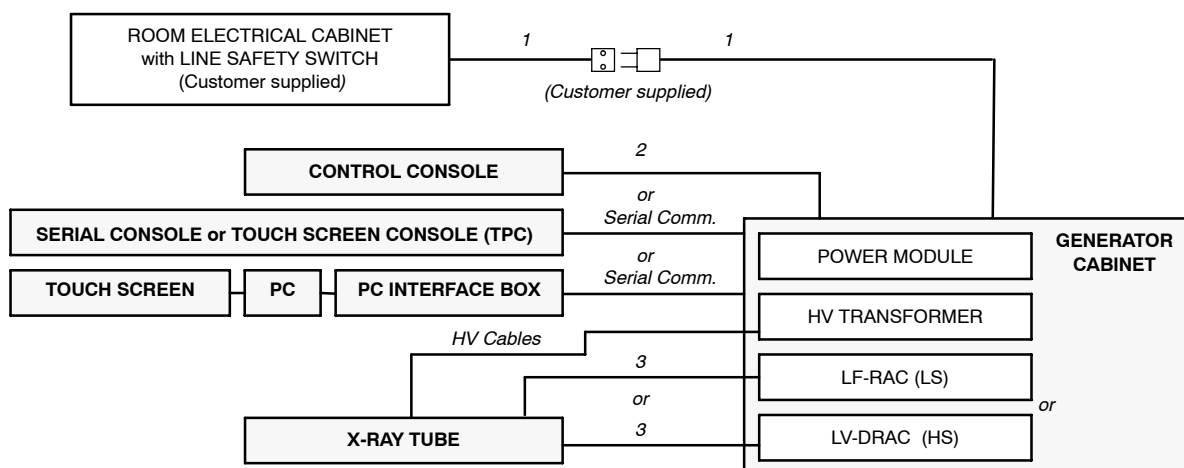
Interconnection Block Diagram for CAPACITOR ASSISTED GENERATORS



Note

For Serial Generators (RS232 / RS422): Console CPUs are located inside the Generator Cabinet and Interconnections are factory made. Only one cable (serial communication) from J5 of the Generator Cabinet should be connected to the Serial Console, Touch Screen Console or PC Interface Box.

CABLE RUN	FUNCTION	REMARKS
1	Single-Phase Line. 100 / 110 / 120 / 208 / 230 / 240 VAC.	The Unit is connected by a Line Plug. Power Line from a Room Electrical Cabinet with Safety Switch. <i>Line plugs and cable are Customer supplied.</i>
	Ground.	
2	Control Signals and Ground	Cable quantity depends on the options installed (AEC, etc.)
3	Stator Supply.	<i>Provided with X-ray Tube.</i>
	Ground.	
NOTES: - For wire size refer to Section 3.6. Consult to Local Standards for feeder and ground wire size requirements. - The system power ground point is located in the Generator Cabinet.		

Illustration 3-3**Interconnection Block Diagram for BATTERY POWERED GENERATORS****Note**

For Serial Generators (RS232 / RS422): Console CPUs are located inside the Generator Cabinet and Interconnections are factory made. Only one cable (serial communication) from J5 of the Generator Cabinet should be connected to the Serial Console, Touch Screen Console or PC Interface Box.

CABLE RUN	FUNCTION	REMARKS
1	Single-Phase Line. 110 / 208 / 230 / 240 VAC.	The Unit is connected by a Line Plug. Power Line from a Room Electrical Cabinet with Safety Switch. Line plugs and cable are Customer supplied.
	Ground.	
2	Control Signals and Ground	Cable quantity depends on the options installed (AEC, etc.)
3	Stator Supply.	Provided with X-ray Tube.
	Ground.	
	Generator provided with LV-DRAC requires a shielded stator cable. (Refer to "Installation" document).	Field supplied.
NOTES: - For wire size refer to Section 3.8. Consult to Local Standards for feeder and ground wire size requirements. - The system power ground point is located in the Generator Cabinet.		

3.10 SAFETY DEVICES

Devices such as Safety Switch / Emergency Switch, Warning Light, and Door Interlock Switch should be supplied and installed by the customer. (*Refer to Illustration 3-4.*)

SAFETY SWITCH / EMERGENCY SWITCH

The main Safety Switch should be installed in the Room Electrical Cabinet (Room Disconnect) (close to the Generator Cabinet), and provided with light indicators for “Power On / Off”. It should be used for main disconnection, and located in an accessible place where it can be seen and controlled during operation and service.

Other Emergency Switches should be installed in accessible locations in the room (near to the main entrance door or to the Control Console) for use in an emergency. They should be connected to the Room Electrical Cabinet (Room Disconnect) so that they cut power to the Generator when they are activated.

The rating of these switches should be: 10 A, 500 VAC, NC.

DOOR INTERLOCK SWITCH

The Door Interlock Switch indicates to the operator when Doorways to the X-ray room are open. It inhibits or not the X-ray generation, according to the Local Standards and customer preferences.

This switch should be installed in the entrance door(s) and its connecting cable should be routed to the Generator Cabinet.

WARNING LIGHT

The Warning Lights are signal lamps installed outside of the X-ray room (near of the main entrance) that indicate:

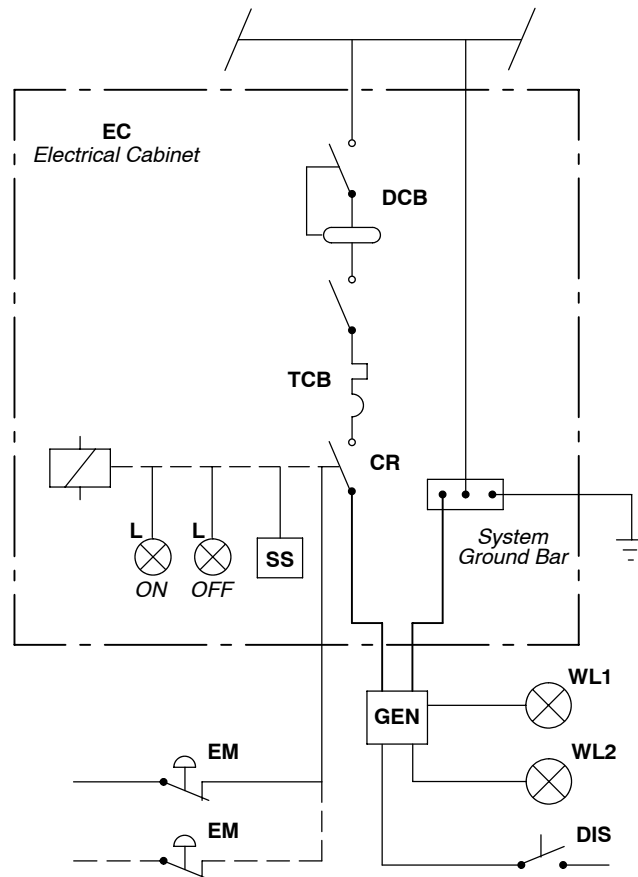
1. The system is under voltage (red lamp “ON”).
2. X-ray exposure in process (yellow lamp “ON”) (*for connection refer to Installation document.*)

The Warning Lights connection cables should be routed to the Generator Cabinet.

Note 

In any case, the installation must be in compliance with the Local Regulation.

Illustration 3-4
Room Electrical Cabinet and Mains Connection



LEGEND

- EC:** Electrical Cabinet (Room Disconnect) for powering X-ray equipment. *(Customer supplied)*
- DCB:** Differential Circuit Breaker.
- TCB:** Thermomagnetic (or Fuses) Circuit Breaker.
- CR:** Contactor controlled by the Safety Switch (**SS**).
- SS:** Safety Switch used for Generator main disconnection, with ON/OFF positions.
- L:** ON / OFF Indicator Lamps located on the Electrical Cabinet.
- EM:** Emergency Switch near to Control Console and/or to the Room main entrance.
- GEN:** Generator Cabinet.
- WL1:** X-ray Emission Indicator Lamp (yellow lamp) connected to the Generator Cabinet, located outside of the X-ray Room (above the exam room entrance).
- WL2:** Warning Light (red lamp) located outside of the X-ray Room (above the exam room entrance).
- DIS:** Door Interlock Switch located on the main entrance(s).

This page intentionally left blank.